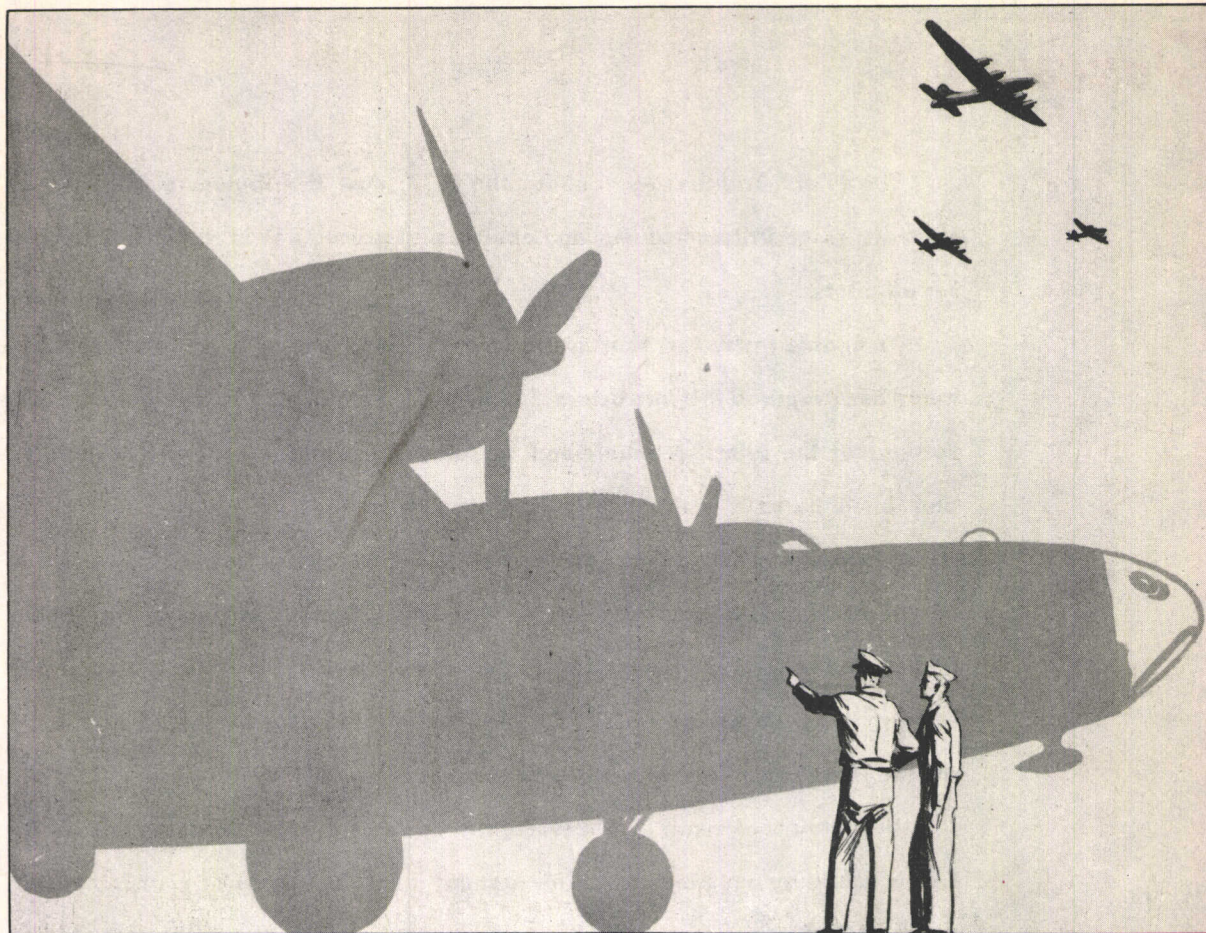


RESTRICTED



**INSTRUCTOR'S SUPPLEMENT TO**  
**PILOT TRAINING MANUAL**  
**for the**  
**FLYING FORTRESS**  
**B-17**

Published for  
**ARMY AIR FORCES TRAINING COMMAND**  
by Headquarters, AAF, Office of Flying Safety

RESTRICTED

COPIER LITHOGRAPH CORP., CLEVELAND, OHIO  
OCTOBER, 1944 - G200



RESTRICTED

## Foreword

The Pilots' Training Manual for the B-17, now distributed to all 4-engine students, standardizes training and operational procedures in the Flying Fortress for all pilots.

To enable instructors to make the most effective use of it, the Training Command has prepared this Instructors' Supplement. Each section is keyed to pertinent sections of the Pilots' Manual, and contains the practical teaching techniques and tips to be used in that particular phase of training.

The Training Command has assured the Army Air Forces that every one of our pilots will have achieved certain standards. Success in combat operations depends upon the fulfillment of that promise. The neglect of any step in the training program on the part of any instructor or student may lead directly to the failure of an important combat mission.

In a very real sense of the word, the basis of combat efficiency of the Air Forces is laid by our instructors. This manual is for you, to make your job easier, to make your work more efficient, to insure that your efforts will be more highly productive. If you do a complete, thorough and conscientious job, there can be no doubt of the final result.

Bind this Supplement into your personal copy of the Pilots' Training Manual. Use both regularly for reference and review, and as a check on your teaching methods. Together, they adapt the Pilots' Manual perfectly to the training requirements of the Training Command.



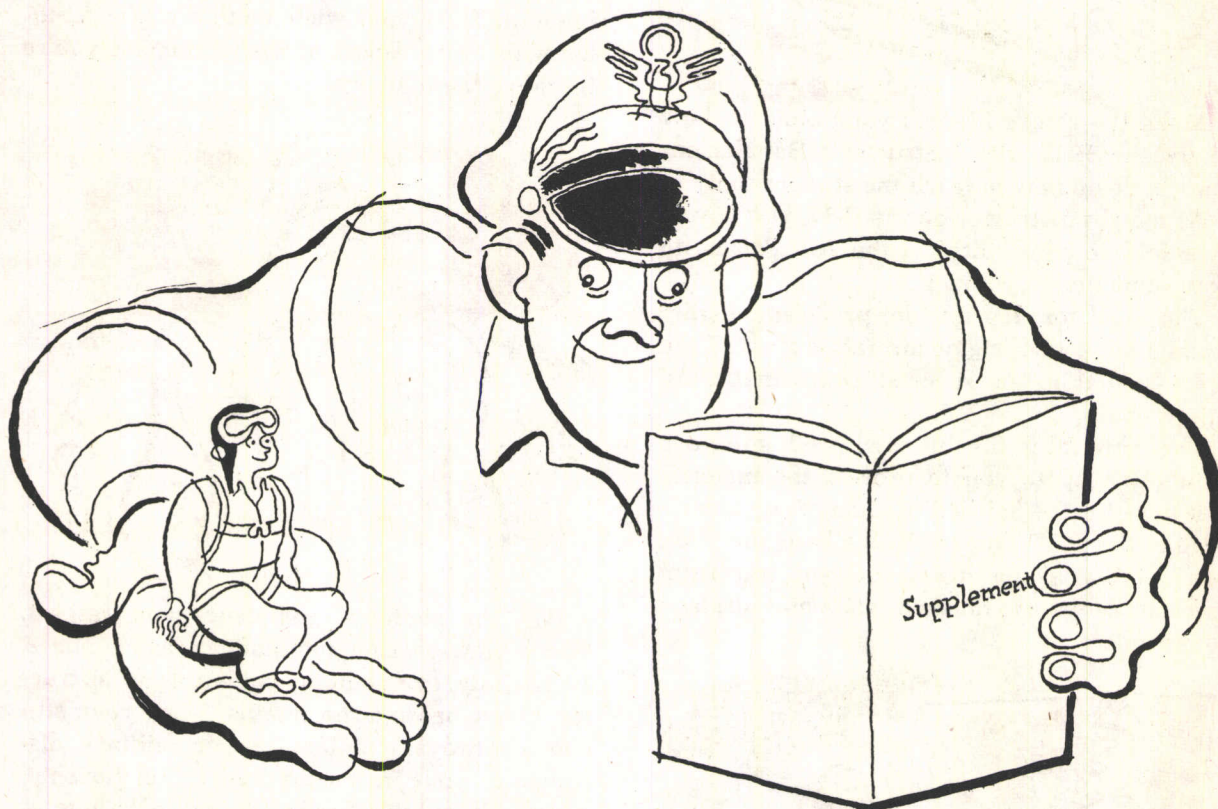
Lieutenant General, U.S.A.  
Commanding

RESTRICTED



# HOW TO USE THE

## *Instructor's Supplement*



This manual is a supplement to the **Pilot's Manual for the Flying Fortress**.

It tells you **how to teach** the detailed information on **how to fly** the B-17 which the Pilot's Manual contains.

It represents the accumulated experience of hundreds of veteran B-17 instructors. By studying it carefully, you can learn in a comparatively short time what they have learned during several years of hard experience.

Use it in conjunction with the Pilot's Manual. Before each period of instruction, review the operational data in the Pilot's Manual that pertain to the procedure or maneuver to be taught. Then review again the section of the

Supplement that contains the specific teaching technique for that procedure or maneuver.

Study the list of common errors and be on the alert to observe when and how the student commits any of them. Utilize the pertinent sections of the Pilot's Manual to point out his errors and emphasize the correct procedure.

Remember that the teaching tips in this supplement are basic truths born of experience and tested by long use. Where the facts in the Pilot's Manual may change as procedures are altered and improved with experience, the plain facts in the Instructor's Supplement will endure, uninfluenced by changes in the operating manual.



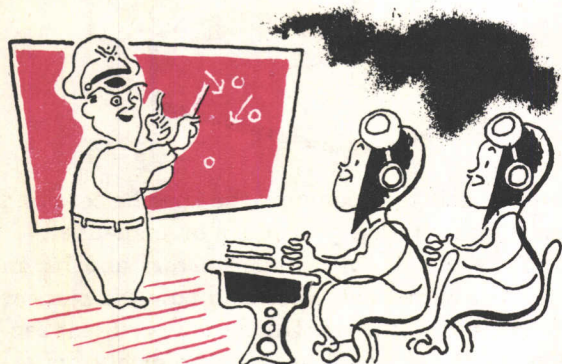


Make the Pilot's Manual your bible on **how to fly** the B-17; the Instructor's Supplement your bible on **how to teach** the student to fly it.

As a flight instructor on the B-17, you have a threefold responsibility: to the Air Forces, to your students, to yourself.

The need for dependable, proficient, highly trained pilots of 4-engine aircraft is great. They are essential to the successful culmination of this war.

The material to fill this vital need is in your hands. It's up to you to process the material and turn out the finished product. Your knowledge of the B-17, your skill as a 4-engine pilot, your ability as an instructor can transform these students into finished pilots and airplane commanders.



It's a big job. But remember, you're training these men for one of the biggest individual jobs in this war: commanding a Flying Fortress in combat. They've got all that it takes to do the job—except the know-how to fly that airplane, and the experience, judgment, and sense of responsibility to command the airplane and its crew. That's your job. You're the instructor; these students are here to learn.

**Make sure that you know what's expected of you.** Analyze your duties and responsibilities. Think of the possibilities if you do the job well—and of the consequences if you fail. Remember that the combat record of each pilot—as well as the fate of his airplane and crew—will depend to a great extent on what you teach him now.

**Know your airplane** and everything pertaining to it. Show your students that you're familiar with every aspect of the equipment you're teaching them to fly.



**Win the students' confidence and respect.** Watch your bearing and manners as an officer. Be friendly, sympathetic, patient as an instructor. Don't become too familiar with your students. Always maintain proper military discipline in your instructor-student relationship. **Above all, exhibit flawless flying technique at all times.** Don't tell a student how good you are—show him!

**Analyze each student.** Treat each man as an individual problem. You'll get all kinds: eager beavers, hot-shots, goldbrickers, and just plain guys. Size up each one as an individual, learn his strong points and shortcomings, and adapt your teaching methods accordingly.

**Work as closely as possible with your students,** individually and in groups, in the air and on the ground. Encourage them to ask questions, and make them have confidence in your answers. The new student may be reluctant to ask questions for fear of showing his ignorance. Get that idea out of his mind.



Remember: A question that may seem trivial to you may be of the utmost importance to the student. Never belittle his lack of knowledge. On the contrary, let him know that you haven't forgotten that you were once a beginner yourself. Tell him that you had to learn things the same way: by listening, thinking, and asking questions. If he fails to ask questions, bring them up yourself.

**Always be careful to set a good example** for the student. Whatever you do, he'll probably do likewise. If you're late, indifferent toward your duties, casual in making your checks and inspections, sloppy in your flying, **that's just the kind of students you'll produce.** Stay on the beam, be conscientious in your work habits, keep your flying sharp, and the majority of students will strive to follow your example.

**Your time is limited.** Take advantage of every facility that will enable you to do a better job in the limited time at your disposal.

**Utilize the ground school.** Your students have a lot to learn about the principles, theories, and equipment associated with the B-17. You can't teach them everything. But the ground school has technical specialists ready to help you with those aspects of the job.

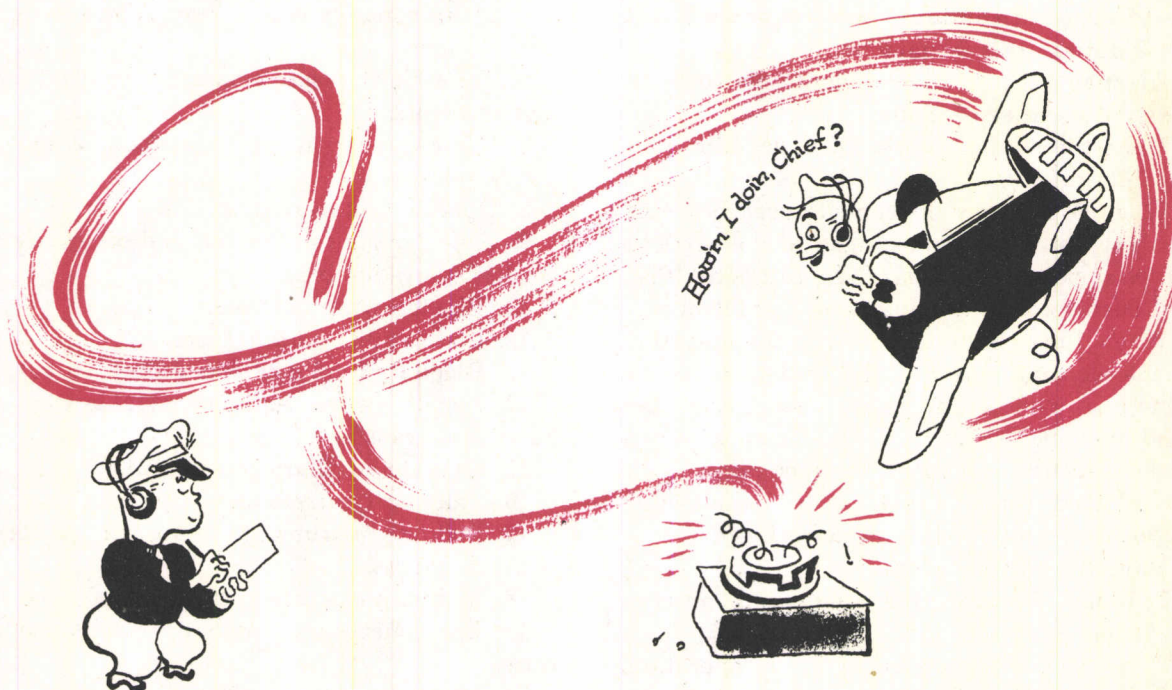
### Tackle the Problem from Both Ends

Maintain close contact with the ground school staff. Let them know what your students need to round out their training. Keep a check on your students' progress in ground school classes, particularly their work in the Link trainer. Find out if any of your students are backsliding or having trouble.

**Give the ground school a boost** to your students. Take a crack at that old idea that ground school is a waste of time, and that flying is all that matters. Emphasize the importance of ground school in rounding out a flyer's knowledge of his job. Tell your students about the pilots who have breezed through ground school, and then learned of their mistake too late and had to go back and learn those subjects the hard way.

### Put the Student On His Own

As soon as he has completed the familiarization phase and can fly the airplane, place him in complete charge, while you act only in the capacity of command pilot or consultant. See that he maintains strict crew discipline in the air and on the ground. Let him make the decisions.





## RESTRICTED

Don't interfere with his performance of duties except to maintain safety in flight.

**Simulate emergencies** and leave the entire handling of the situation to the student. Keep a sharp watch on him, and be sure that everything is under control; but don't interfere unless he is getting himself into danger.

Remember that besides teaching him how to fly the B-17 you must also develop in the student the judgment, confidence, and sense of responsibility that will **qualify him later for his duties as an airplane commander.**

Give **adequate briefing and instruction** to the crew before each mission. Cover all details of the projected lesson on the ground before ac-

tual flight. Help the student to anticipate what he must do on the mission.

**Regarding safety**, remember this: Safety is your responsibility.

But safety isn't something to worry about.

Teach the student correct procedures, see that he follows them always, and **you won't have accidents.**

Impress upon the student that **accidents are always the result of doing things wrong!**

Be positive in your instruction. Demonstrate the correct way of doing things. Teach the "do's" and not the "don'ts."

**Never let the student go too far without taking corrective action.**

## KEEPING STUDENT OCCUPIED



Plan every training flight so that each student has definite duties to perform and see that these duties are alternated.

Arrange time so that students alternate in the pilot's seat every hour.

Make the student work. Don't let him have any idle time.

When you occupy the copilot's seat, have the extra student perform as many of the copilot's duties as possible, such as radio calls, checklist, and even some of the operation of controls.

When it does not interfere with the operation of the airplane, question the student to determine how well he understands the reasons behind the operations he is performing. When extra students are aboard, or when you occupy the pilot's or copilot's seat, assign the following duties to keep the extra students busy.

Have the extra student:

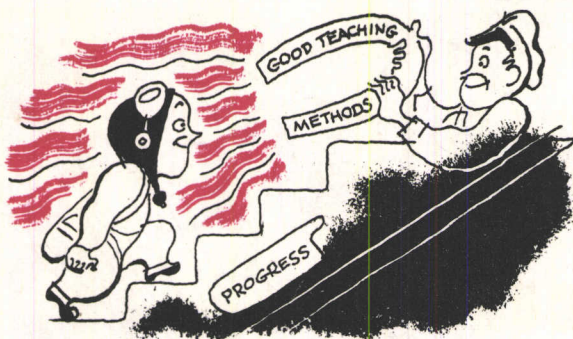
1. Stand between the seats and observe flight maneuvers.
2. Answer questions on errors in operation.
3. Take drift readings.

4. Navigate.
5. Make contacts with Army Airways Control Stations.
6. Tune liaison and command transmitters and receivers.
7. Review location and operation of emergency releases.
8. Operate fuel transfer system.
9. Give dry runs on bailout and other alerts.
10. Take radio fixes.
11. Change whip antenna.
12. Locate all important fuses.
13. Bleed hydraulic system (check valve).
14. Install (when equipment is available) hand fuel transfer pump.
15. Operate auxiliary power unit.
16. Take oral quizzes on all systems.
17. Follow instrument flying of pattern, using diagrams.
18. Manually operate gear and flaps.
19. Use emergency radio operating procedures.
20. Listen on radio during all training.



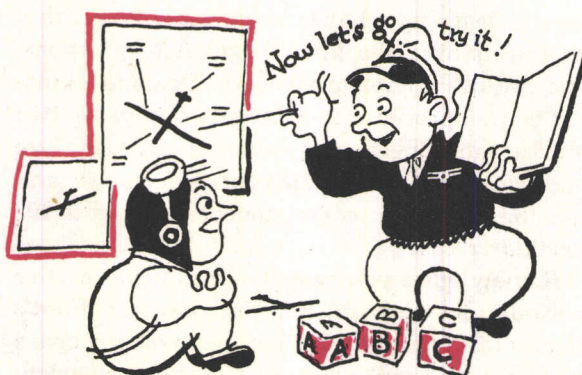
# SIX TEACHING PRINCIPLES

**Organize your personal instruction with these six simple teaching principles in mind and you won't go wrong**



## 1. Arouse the Student's Interest

Before each teaching period, outline to the student the particular subject, procedure or maneuver to be taught. Tell him what it is, how it is done, and why it is important. Analyze the mission. List the principal steps. Pick out the key points. Relate everything you teach to the big, over-all job of flying the B-17 expertly, efficiently, safely. By giving the student a complete concept of the subject at each step—what, how, why—you will keep his interest and attention at highest pitch throughout the instruction period.



## 2. Explain and Demonstrate

Explain how a thing is done, then show the student how to do it. Demonstrate and explain as much as possible on the ground, then tell him how again and show him how in the air.

Remember: Explanation alone is not sufficient; neither is demonstration alone. If possible, demonstrate and explain simultaneously. In the long run, this dual method of driving home each fact will save a lot of time and talk. Use every available visual aid: the illustrations in the Pilot's Manual, models, charts, your own diagrams, the airplane itself.



## 3. Find Out What the Student Knows

Don't waste time telling the student something he already knows. Ask him specific questions. Find out what he's learned. Concentrate on teaching him what he does not know. Don't expect him to learn too much too soon. You may have to go over the same thing twice, or perhaps several times before he learns it. Don't become impatient if the student is slow in getting your point.

## 4. Let the Student Demonstrate

Give the student a chance to practice and demonstrate whatever you are trying to teach him. Tell him and show him how to do it—then let him do it himself. If four out of five students can demonstrate what you have taught





them, you can be reasonably sure that your method of instruction is sound—the fifth student needs a little more personal attention. If only two out of five grasp the idea, check on your teaching method. The fault lies with you. If you have trouble analyzing your own teaching methods, check with other instructors or supervisory personnel. Consult the Pilot's Manual. Don't get in a hole by bluffing students with the "I think . . ." type of answer. If you don't know the correct answer, tell the student you'll look up the point and tell him the next time he reports.



### 5. Correct the Student's Errors

Be on the alert and observe and analyze your student's errors. Correct his errors as he makes them in the air, or as soon afterwards as possible on the ground. Be patient. Show him

where he is making his mistake, and why his manner of performing the operation is wrong or dangerous. Take advantage of correcting his errors to re-emphasize the correct procedure. Make your explanations brief, pointed, but complete. Have him repeat the demonstration to be sure that he understands the correct procedure.



### 6. Check and Review

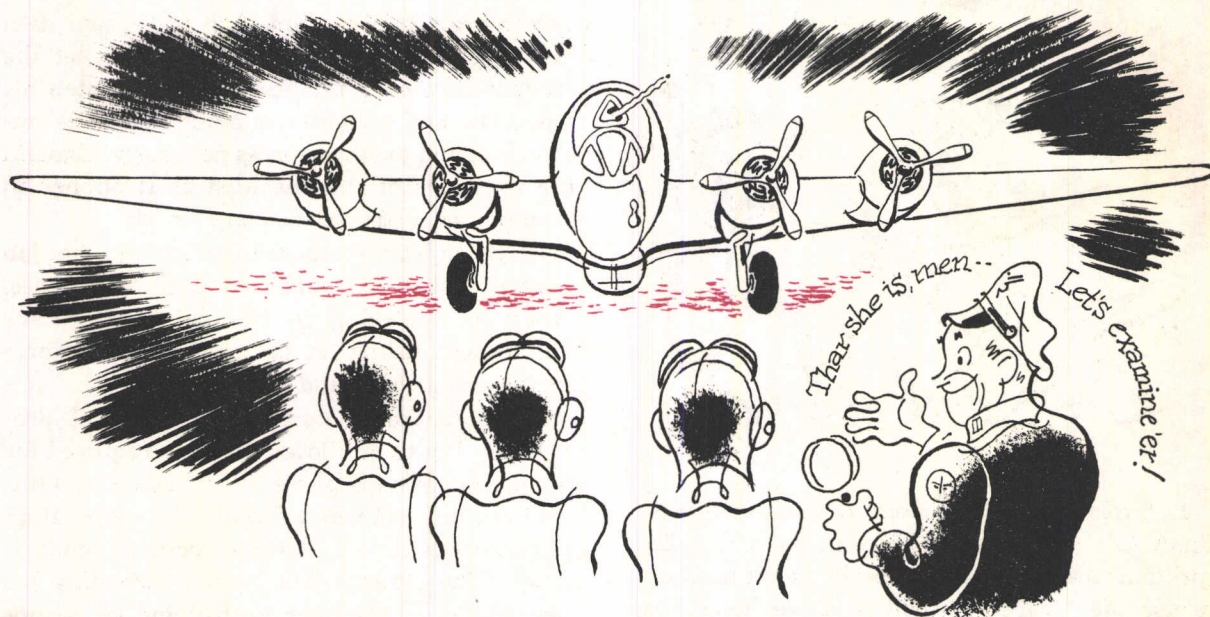
Check constantly to be sure that your student is learning what is being taught, and that he is retaining the knowledge. Ask questions, and require complete answers. Demand explanations of procedures taught two days or two weeks ago. Check and review daily. Analyze each student's shortcomings or deficiencies, and use the method of correction best suited to his particular case.

Review what you have taught during earlier periods. See that the student uses the Pilot's Manual. Have him read the manual to prepare for what you will teach in tomorrow's period; have him use it to review what you have taught him today. Have him go back and review those sections that are related indirectly to what you are now teaching. Encourage him to amplify sections of the manual with his own notes.



# INTRODUCTION TO AIRPLANE

SEE PILOT'S MANUAL PAGES 26 TO 45



In introducing the student to the B-17 airplane, follow the detailed outside and inside preflight inspection procedure outlined in the Pilot's Manual.

Remember that while the student has already been introduced to parts of the airplane in ground school, this is his introduction to the airplane as a whole.

**On this introductory tour, take your time.** The instruction principles here are **demonstration** and **explanation**. Point to each part of the airplane, name it, and explain its function. Then ask questions to see if the student understands the point.

Encourage questions, but explain things first, since this is all new to the student.

Be sure that your explanation of each item is adequate.

Do not overlook any item merely because it seems self-evident to you. The student is encountering this equipment for the first time.

Don't expect the student to remember everything you cover the first day. Repeat and re-

view the introductory points in subsequent instructions. Then question the student to make sure that his general knowledge of the airplane is accurate and reasonably complete.

## Common Errors

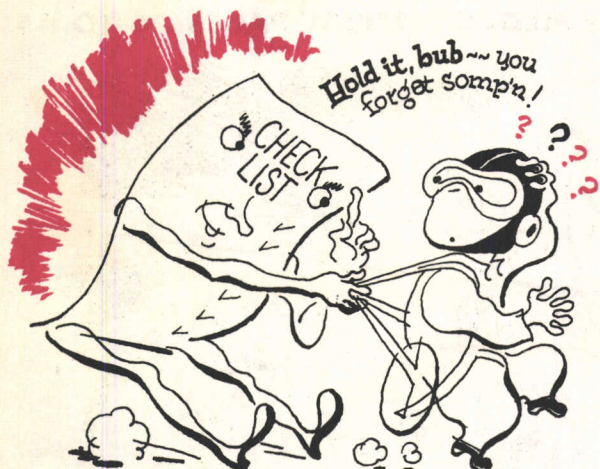
Avoid these common errors made by instructors in introducing a new student to the B-17:

1. Not enough attention paid to this phase—usually because the instructor is impatient to begin actual flight instruction.
2. Inadequate explanation of equipment and its function. Cover everything; give complete explanations.
3. Overlooking items that seem self-evident to instructors. Don't neglect anything. It may be old stuff to you—to the student it's new and strange!



# INSPECTIONS AND CHECKS

SEE PILOT'S MANUAL PAGES 46 TO 56



1. Explain to the student the possible consequences (equipment failure in the air) if inspections are not made properly. Don't hesitate to use the "scare" method to drive home the importance of preflight inspections and checks. The consequences of preflight carelessness and indifference are really grim. Don't let familiarity with the airplane breed carelessness.

2. Make the student announce verbally any defects in equipment that he finds during his inspections. This brings the defects to your attention, and makes the student remember them.

3. Let the student fill out Forms 1 and 1A and the loading list (Form F). Teach him the proper use of all three. Place responsibility for these items directly on the student, but be sure to check them yourself.

4. Insist from the outset on proper use of the checklist. Use the exact checklist language. Have the student keep his thumb on each item on the checklist, as it is called aloud and checked, before moving on to the next item. **Make him call out items and responses in a clear, firm voice.**

5. Have the amplified checklist handy. Make the student actually check off each item and touch each instrument or control. Be sure he understands **what** he is checking, and **why**.

6. Before and during the first ride, name, demonstrate and explain each individual item on the checklist. After the first flight, let the student take over the checklist, but watch his technique and give him as much additional instruction and explanation as necessary. Explain the sequence of the checklist as it applies to **grouping** of instruments, controls, etc.

7. Never let the student-copilot take his job lightly. Make him perform all copilot duties. When you are riding in the copilot's seat, have the student riding on the swing-seat perform copilot duties and read the checklist.

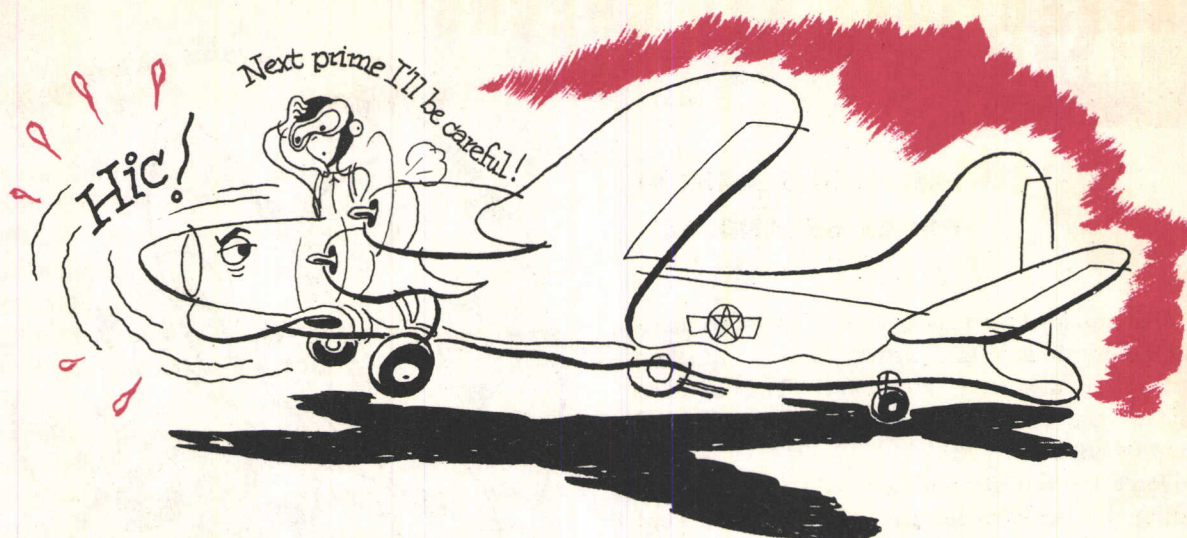
8. Emphasize cockpit and operational procedures. Try to cut down the time required for completion of each phase of the checklist without impairing efficiency. Emphasize cooperation and coordination. Encourage cockpit familiarization. The student will be indoctrinating his own copilot in the near future, and he cannot do it properly unless he knows the procedures himself.

---

## *Watch for These Common Errors*

1. Failure to execute checklist properly.
  2. Failure to use precise checklist terminology.
  3. Overlooking in the preflight check those parts of airplane that are not immediately apparent.
  4. Relying on instructor to make each check —and the instructor allowing the student to get away with it.
  5. Failure to call off checklist items loud enough for pilot to understand.
  6. Failure of student to look around outside airplane while completing checklist.
  7. Copilot getting ahead of pilot during checklist procedure.
-





## STARTING

**SEE PILOT'S MANUAL  
PAGES 57 TO 64**

1. Demonstrate and explain starting procedure for the first time while occupying the copilot's seat. Make the second demonstration from the pilot's seat. Notice that most common errors are made by the student while performing copilot duties.

2. Explain the importance of the fire guards and their proper positions. Call the student's attention to the difference between aircraft with CO<sub>2</sub> fire extinguisher systems and those without.

3. Show the student various ways to speed up starting procedures. Naturally, he will be slow at first. Don't rush him, but demonstrate ways to eliminate waste motion. Example: Show him how he can check oil pressure as the gage indicates rise, without waiting for full pressure to be registered.

4. Point out and explain the response of the various instruments as the engines are started.

## *Watch for These Common Errors*

1. Failure to check proper posting of fire guard, and not indicating engine about to be started.
2. Improper use of primer.
3. Improperly energizing the starters.
4. Improper use of mixture controls.
5. Failure of pilot and copilot to coordinate while energizing and meshing starters.
6. Failure to check flight indicator as engine is started.
7. Failure to check following items:
  - a. Inverter output.
  - b. Air filters (only switch position and not lights are checked).
  - c. Both vacuum pumps.
8. Waiting too long to check instruments, then wasting time.
9. Failure to have one member of crew watching outside for movement of airplane.
10. Lack of definite plan for checking instruments.
11. Improper reactions when engine fails to start.



# TAXIING

**SEE PILOT'S MANUAL  
PAGES 65 AND 66**

The quickest and easiest way to teach taxiing technique is to taxi with tailwheel unlocked (except in a strong crosswind). This is done best at the end of the period, when inboard engines have been cut.

Don't let the student get into the habit of riding the brakes. See that his heels are kept on the floor (except when actually using brakes).

Teach proper use of throttles and brakes. The new student inevitably overcontrols throttles and does not anticipate the effect of excessive throttle.

Stress the importance of slowing down to desired taxi speed and not to a full stop.

Emphasize proper crosswind taxiing. Stress coordination of throttle and tacking.

Stress the necessity of taxiing slowly.

Stress checking tail for clearance when turning, especially when near obstructions, or near end of taxi strip or runway.



## Watch for These Common Errors

1. Riding brakes.
2. Overcontrolling with throttles.
3. Attempting to use rudder and aileron for directional control.
4. Trying to unlock tailwheel while pressure is still on locking pin.
5. Starting the turn too near edge of runway when taxiing crosswind.
6. Failure to maintain proper clearance between airplane and obstructions.
7. Locking and unlocking tailwheel unnecessarily.
8. Pivoting on the inside wheel.
9. Paying too much attention to tailwheel light rather than concentrating on control of the airplane while taxiing.
10. Failure to check brakes, hydraulic pressure, wheels, and tires while taxiing.
11. Difficulty in maintaining full control because of improper adjustment of seat and pedals.



# ENGINE RUN-UP

SEE PILOT'S MANUAL PAGES 67 AND 68

1. During engine run-up, divide the work between the student pilot and the copilot.

2. Where different series of the B-17 are in use, emphasize the difference in run-up procedure between the different models.

3. Teach the student not to concentrate all his attention inside the cockpit during engine run-up. Make him look around to guard against any movement of the airplane.

4. Explain the difference in the number of propeller pitch movements required for cold and hot weather operations.

5. Use approximate manifold pressure settings for checking magnetos during engine run-up. This will shorten the time necessary for the engine check.

6. Remember that the student already is familiar with run-up procedure of an engine **except for the turbo-supercharger**. Give him a clear explanation and demonstration of the use and operation of the turbo-supercharger. Stress the fact that faulty use of turbos causes most of the engine failures.

## Watch for These Common Errors

1. Lack of proper checklist indoctrination, which is principal cause of the following student errors.

2. Running the propellers through too many times, especially during warm weather.

3. Worrying about exact manifold settings; consequently losing time during engine run-up.

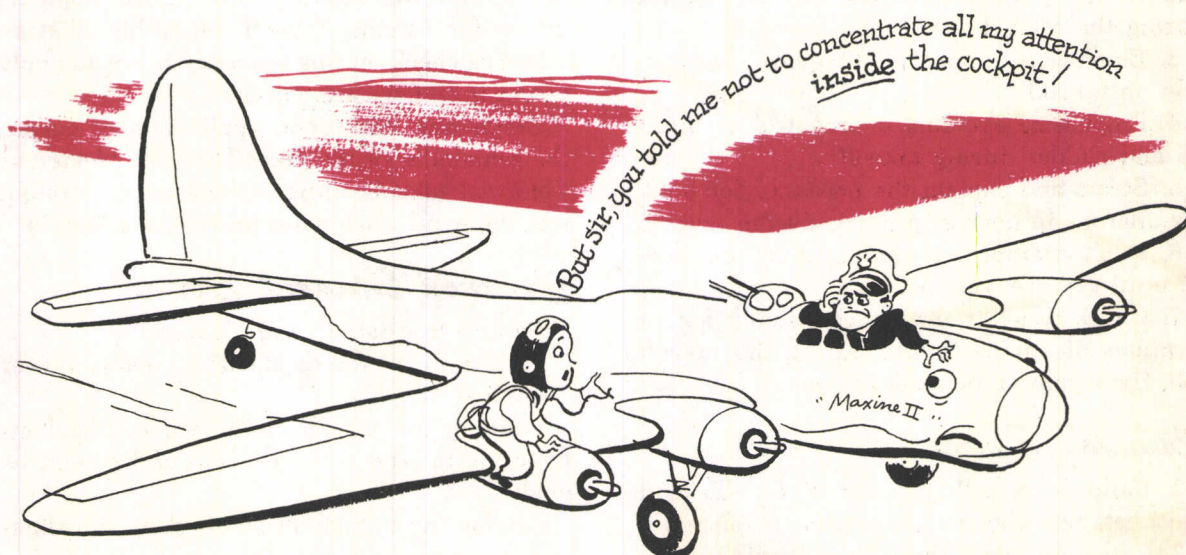
4. Taking too much time to set turbos, and allowing the engine to run too long at full power on the ground.

5. Loss of time in returning the engine to idling speed after checking.

6. Failure of pilot and copilot to check all engine instruments during run-up.

7. Failure to retard throttle while removing chocks.

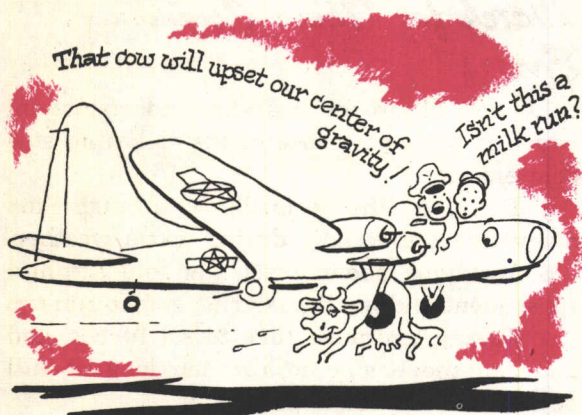
8. Failure of pilot to hold brakes during engine run-up.





# TAKEOFF

**SEE PILOT'S MANUAL  
PAGES 69 AND 70**



Your instruction job will be easier if you give the student a thorough and careful indoctrination in proper cockpit procedure before the first takeoff.

1. Emphasize the necessity for clearing the runway for traffic and obstructions, even after being cleared by the tower.
2. Keep a close check on the student copilot and avoid any tendency to use excessive power during the takeoff.
3. Emphasize proper pilot-copilot coordination on takeoff.
4. Emphasize avoiding overcontrol of throttle and rudder during takeoff.
5. Stress and explain the necessity for holding ailerons in neutral position during takeoff.
6. Don't attempt to explain mistakes on takeoff until you are well in the air.
7. Check nacelles and wings visually for indications of engine failure during the takeoff roll. Have your students do the same.

## *Common Errors*

1. Failure to call for the Before-Takeoff checklist, even though it has been completed.
2. Failure to clear the runway rapidly after taxiing out.

3. Failure to apply throttles rapidly and steadily, leading with the upwind engine.

4. Applying differential throttling before full rudder has been applied (or, in many cases, even attempted).

5. Inadvertently applying brakes during takeoff roll because heels are not on floor.

6. Failure of student copilot to follow through on the throttles and to keep close check on instruments, avoiding excess manifold pressure and rpm.

7. Copilot spending either too much time with his eyes inside the cockpit or too much time looking outside the cockpit.

8. Failure to apply proper crab into the wind after the airplane is airborne.

9. Failure to use brakes to stop rotation of wheels prior to retracting gear.

# RUNNING TAKEOFF

**SEE PILOT'S MANUAL  
PAGE 71**

Insist upon the student's letting the airplane settle into the landing roll before applying power for running takeoff. Show him that an effective check on this tendency is not to apply power until flaps are half up.

Emphasize that, upon application of power, the remainder of the takeoff is to be treated as a normal takeoff, either crosswind or straight into the wind. (See notes on normal takeoff.)

## *Common Student Errors*

Failure to establish the landing roll.

Failure to get the flaps half up before power is applied.

Landing too far down the runway and attempting to land when a go-around should be made.

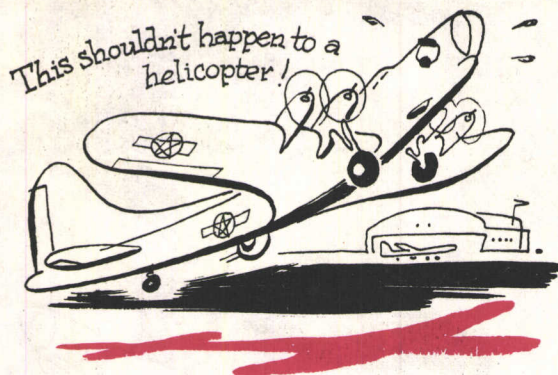
Attempting to take off before properly aligning on runway.

Using brakes to keep airplane straight.



# MAXIMUM PERFORMANCE TAKEOFF

SEE PILOT'S MANUAL PAGES 130 TO 131



Before demonstrating this maneuver, be sure that the student has been properly briefed.

Be sure that every condition for the maximum performance takeoff is set before the brakes are released for the takeoff roll.

Call the student's attention to the difference between the normal and maximum performance takeoff run. A good way to demonstrate

this is to make a normal takeoff followed by a maximum performance takeoff, checking the length of the roll against the yardstick along the side of the runway.

Teach the student to avoid raising flaps when climbing near stalling speed.

## Common Student Errors

Starting the takeoff roll before initial power has been applied.

Failure to hold elevators back during initial application of power. (Elevators should be streamlined for 3-point takeoff.)

The tendency to assume a nose-high attitude immediately after takeoff, caused by back pressure on the column during the roll.

Permitting airplane to settle when flaps are retracted.

# FLYING THE TRAFFIC PATTERN

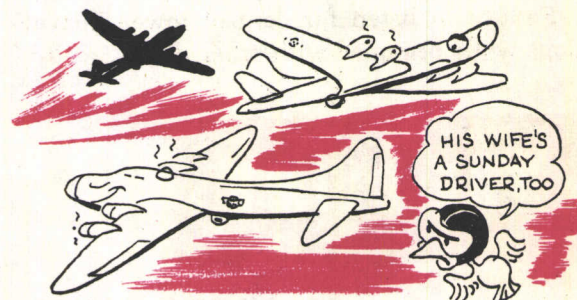
SEE PILOT'S MANUAL PAGE 92

Teach a student to plan his work so that when he is supposed to enter the traffic pattern, he is in proper position and at the proper altitude. Teach him to plan his let-down before getting over the field.

Teach the student to anticipate the Before-Landing checklist so that it can be completed at the proper time, prior to entering traffic pattern.

Stress the importance of compensating for drift in the pattern in order to maintain the track of the airplane parallel, or at a right angle, to the landing runway. Demonstrate the ease with which the pattern may be flown by following magnetic headings corrected for drift.

Stress the importance of clearing the area before making turns, and centering attention outside of cockpit.



Stress the importance of proper spacing in the pattern established by the proper turn-off from the takeoff leg.

Explain to the student that the traffic pattern is nothing more than a flight from point to point on a rectangle around the runway. Stress the necessity of maintaining proper airspeed, altitude, spacing, and track.



## RESTRICTED

Point out that the same considerations of air-speed and drift apply here as in a cross country flight. Have him notice this particularly on the downwind and approach legs. Drive this point home now, and the problem of crabbing and winging down on the approach leg in a cross-wind will be relatively simple.

Keep the traffic pattern close to the field.

Insist on precision flying of the traffic pattern in accordance with local flying policies. Precision flying at this point is comparable to close order drill, and will have the effect of making other precision flying and air discipline exercises easier.

### *Common Student Errors*

Failure to maintain traffic altitude and speed.

Turning into the entry leg too far from the field.

Failure to compensate for drift.

Setting the base leg too far from the runway.

Failure to maintain proper spacing—caused by the student's fear of prop wash.

Turning outside the path of the preceding airplane on downwind and base legs.

Using full aileron before rudder to recover from the effects of prop wash.

Failure to consider other aircraft in the traffic pattern.

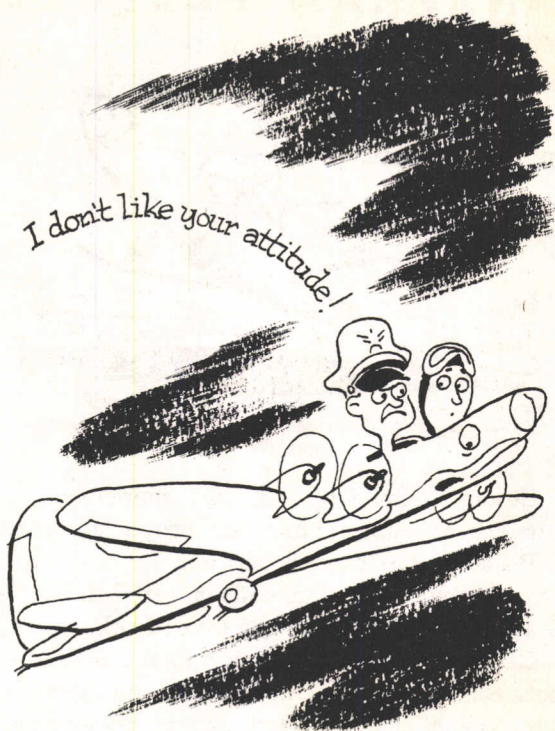
Tendency to concentrate attention inside cockpit.

Failure to listen for control tower instructions while occupied with other duties.

## THE CLIMB

### **SEE PILOT'S MANUAL PAGES 72 TO 76**

Emphasize correct application of power, stressing the combination of manifold pressure and rpm for the climb. A good way to make the student power-conscious is to announce the desired combination of manifold pressure and rpm for each power change that he makes.



This is an ideal time to indoctrinate the student in the proper use of cowl flaps. Make him cylinder-head-temperature conscious. Explain the best method of reducing engine heat.

Stress the importance of holding airplane in the proper attitude to maintain climb.

Demonstrate to the student that, at climbing airspeed, pulling the nose up and decreasing the airspeed causes the rate of climb to fall off.

Stress maintenance of proper airspeed in the climb.

### *Common Student Errors*

Failure to watch for drop in manifold pressure with resulting reduction of power during climb. (B-17F only.)

Failure to maintain constant climbing attitude. (Insistence on proper attitude at this time will simplify the basic instrument flying later on.)

Failure to trim properly for climb.

Leveling off at the desired altitude, instead of on top of the desired altitude.

Failure to watch temperature gages.



## CRUISING

**SEE PILOT'S MANUAL  
PAGES 81 TO 84**

To teach the student the differences in cruising power settings, have him set up correct power settings to correspond with various cruising requirements.

Practice long-range cruise control even on short hops.

### *Common Student Errors*

Incorrect combinations of rpm and manifold pressure.

Failure to cruise at the lowest power setting for the mission being performed.

## STALLS

**SEE PILOT'S MANUAL  
PAGES 89 AND 90**



Demonstrate stalls in order from the high-speed stall to the low-speed stall: power off, power on, power off with wheels down, power on with wheels down, power off with wheels and flaps down, power on with wheels and flaps down, power off with de-icer boots operating (wheels and flaps down), simulated 2-en-

gine operation with flaps and gear down and full power on good engines. Be sure the student recognizes the characteristics which precede the stall.

Emphasize the indicated airspeed at which the stall occurs.

Emphasize proper stall recovery.

Demonstrate the difference in stalling speeds caused by the increased wingloading in turns.

Demonstrate the importance of the rudder in recovering from a wing-down stall.

Impress upon the student that by studying the airplane's stall characteristics he can determine proper gliding speed and landing speed.

### *Common Student Errors*

Lowering the nose too much on recovery, and not using sufficient power to aid recovery.

Rough handling of the controls and throttles.

Using aileron at or near the stalling speed.

Failure to clear the area before beginning stalls.

Excessive speed during recovery.

## URNS

**SEE PILOT'S MANUAL  
PAGE 88**

Students have a tendency to make aileron turns with the B-17 because of its large vertical fin surface. To counteract this tendency, emphasize and re-emphasize the use of rudder. This is particularly important in instrument flying, where aileron turns have the effect of increasing the degree of bank without increasing the rate of turn.

Don't forget to demonstrate the varying angle of bank required for time-turns at various speeds.

### *Common Student Errors*

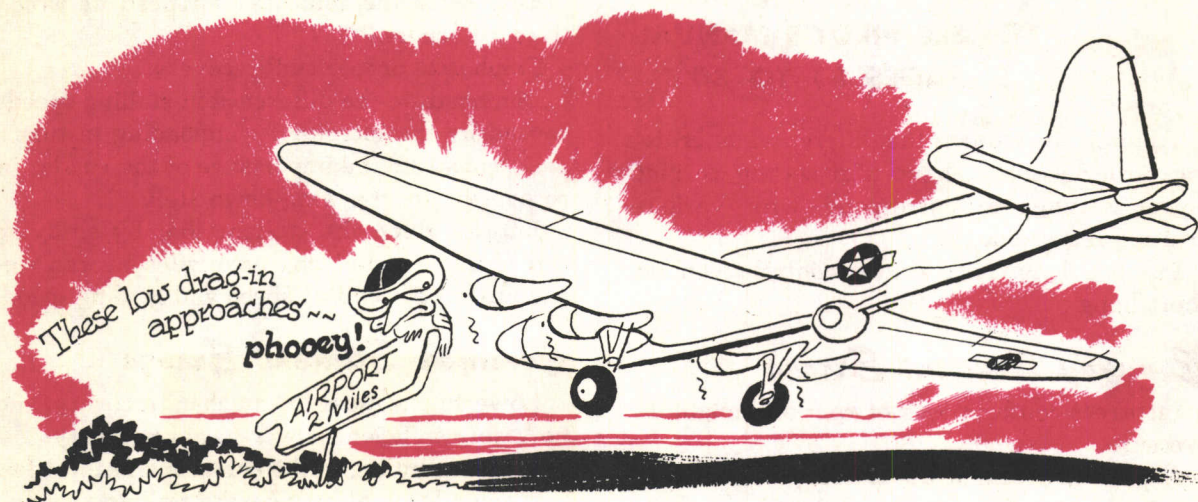
Making turns with aileron only.

Attempting to bring the nose up by back pressure and not decreasing bank.



# POWER-ON LANDING

SEE PILOT'S MANUAL PAGE 95



In turning on the final approach, if student has difficulty lining up with the runway, teach him to undershoot his turn rather than overshoot it. As the turn develops he can let up on his bank, thereby decreasing his rate of turn and rolling out properly lined up with the runway.

Emphasize the importance of blending power reductions with the change to glide attitude upon entering the approach to the runway.

After you establish gliding speed, teach the student to aim at a point just short of the runway. Then, when he breaks his glide and reduces his power, he lands in the first 1/3 of the runway.

Impress on the student that a good landing results from the establishment of a proper glide and proper breaking of that glide.

Teach the student to establish a smooth glide by ignoring small corrections in airspeed and taking the average of the airspeed being indicated. This avoids any tendency to jockey the wheel and throttle during the glide.

Don't let the student go too far in making errors. Correct his errors as you go along, carefully explaining the proper procedure. Don't confine your instruction to telling him what not to do. Keep all instruction positive, always emphasizing the correct procedure.

Emphasize the dangers of the long, low, dragging approaches.

**Teach the student not to be afraid to go around.** Impress upon him that if the procedure is not correct, or if the glide path has not been established properly, or if the speed has fallen off, no benefit will be derived from completing the landing. Emphasize: elevators control air-speed; throttles control rate of descent.

Stress the fact that the power settings on the approach are only a means to an end. Tell the student that they are important only in maintaining the desired speed, and in accurately landing the airplane on a desired spot.

When the student makes a bounce landing, teach him to hold the same pressure on the wheel as at the time of the bounce, then to gradually increase back pressure and make a normal landing. Sometimes, after a bounce landing, it may be necessary for you to decide whether to let the student complete the landing, or to have him go around and try again.

In crosswind landings, point out to the student that proper elimination of crab has a tendency to raise the down wing. Therefore, teach him to concentrate on removing the crab in the landing rather than raising the wing. Warn him against too early removal of crab and the resulting drift while on the runway.



Impress upon the student that, when making a crosswind landing, he must **anticipate** a crosswind action while rolling on the runway by leading with the upwind outboard engine.

### *Common Student Errors*

Not correcting for drift on the approach, and not lining up with runway when turning on approach leg.

Low, dragging approaches.

Failure to set and maintain a constant glide.

Jockeying the throttles or wheel (or both) during the approach.

Failure to cut throttles completely before landing.

Failure to go around when necessary.

Failure to coordinate throttle movement with movement of control column—particularly failure to coordinate power reduction with breaking of the glide.

Failure to maintain directional control after reaching the runway.

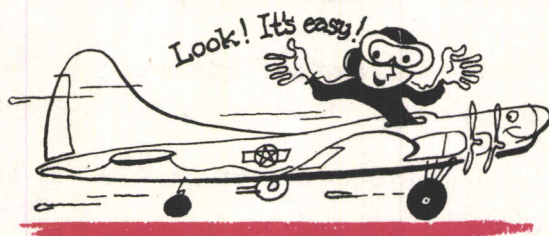
Failure to clear the runway as rapidly as possible.

Improper application of brakes to stop the landing roll.

Failure to eliminate crab in a crosswind just before contact with runway, or eliminating crab and allowing airplane to drift downwind just prior to landing.

## POWER-OFF LANDING

**SEE PILOT'S MANUAL  
PAGE 94**



Demonstrate at what point power reduction must be made in order to make a power-off approach and a precision landing.

RESTRICTED

Stress the relationship of the proper altitude, proper glide, correct base leg, and wind effect to this type landing.

Point out that this type of landing demonstrates the ease with which the B-17 can be landed.

Emphasize that it is taught for training purposes only, and is not an operational maneuver.

### *Common Student Errors*

Inconstant glide.

Breaking glide too low.

Failure to take the four variables into consideration.

## GO-AROUND

**SEE PILOT'S MANUAL  
PAGE 97**



Emphasize the use of just enough power to obtain the desired airspeed for the go-around.

Teach the student to be on the alert and decide for himself when to go around.

### *Common Student Errors*

Applying too much or too little power.

Not correcting attitude as flaps go to full up position.

Raising flaps too soon before or too long after power has been applied.

Forgetting to call for increased rpm before advancing throttles.

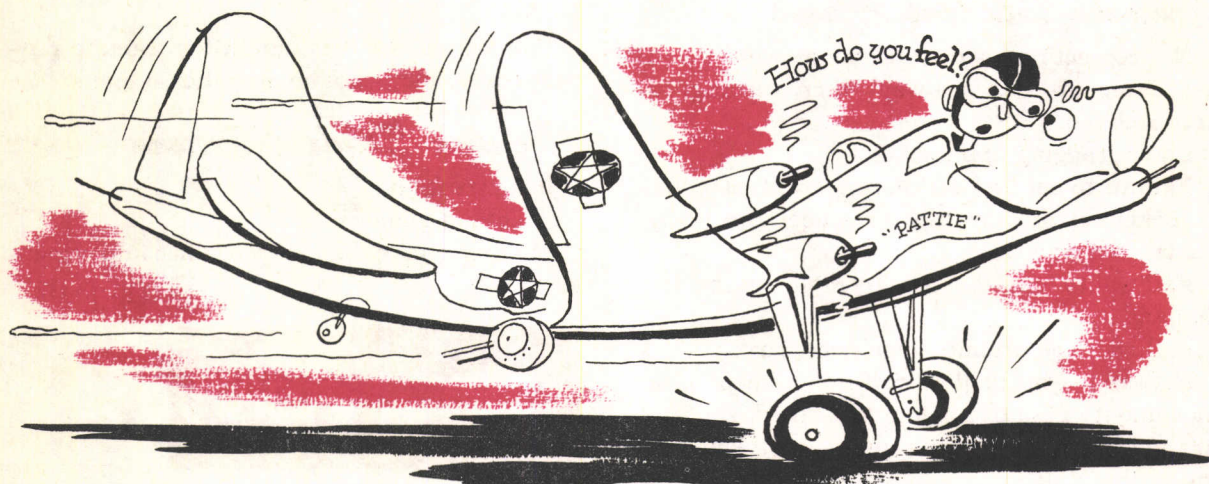
Failure to clear runway to one side; losing sight of airplanes on ground.



RESTRICTED

## MAXIMUM PERFORMANCE LANDING

SEE PILOT'S MANUAL PAGES 131 AND 132



Before attempting an actual demonstration of the minimum-roll landing, simulate minimum-roll landing conditions so that the student can become familiar with the feel of the airplane when full weight is on the front wheels.

Emphasize the minimum roll instead of perfect 3-point landing.

Explain that because wheels are on the runway does not mean weight of airplane is on the wheels. Emphasize that accelerated brake action may be applied as increased weight rests on the wheels.

Be careful in demonstrating this maneuver in gusty wind conditions.

Be on the alert for any tendency to nose up. If this occurs, make proper correction by releasing brakes and applying power, with simultaneous back-pressure on control column.

Have a man (other than pilot) watch each wheel for brakes locking during the roll.

### *Common Errors*

Applying brakes before the weight is settled. Too quick and too much forward pressure on the control column.

Lack of directional control on runway because of uneven application of brakes.

---

## PARKING AIRPLANE

SEE PILOT'S MANUAL  
PAGES 65 AND 98



### *Common Student Errors*

Setting parking brakes while they are still hot.

Leaving airplane without wheel chocks in place.

Failure to turn off all switches.

Failure to permit autosyn instruments to return to zero before turning off inverters.



## 2 AND 3-ENGINE OPERATION

SEE PILOT'S MANUAL PAGES 84, 140, 144-147

Impress upon the student that when an engine is lost during the takeoff, and the airplane is still on the runway, the most important thing is to decide **whether to stop the takeoff roll or to continue taking off.**

In all training flights, let the student make and state his decision, even though you have made up your own mind to continue the takeoff for practice purposes.

Rapid progress will be made if you adhere to the following sequence. In it the maneuvers are progressively more difficult and are arranged in the order that tends to build up the student's experience. After the initial periods have been completed, subsequent practice should stress the takeoff with an outboard engine idle, since proficiency in this operation simplifies the maneuvers with an inboard engine dead. The sequence of instruction is as follows:

1. One-engine failure in flight.
2. 2-engine failure in flight.
3. 3-engine go-around.
4. 3-engine landing.
5. 3-engine running takeoff (a) with inboard engine out, (b) with outboard engine out.
6. 3-engine takeoff (a) with inboard engine out, (b) with outboard engine out.

7. 2 engines cut after takeoff.

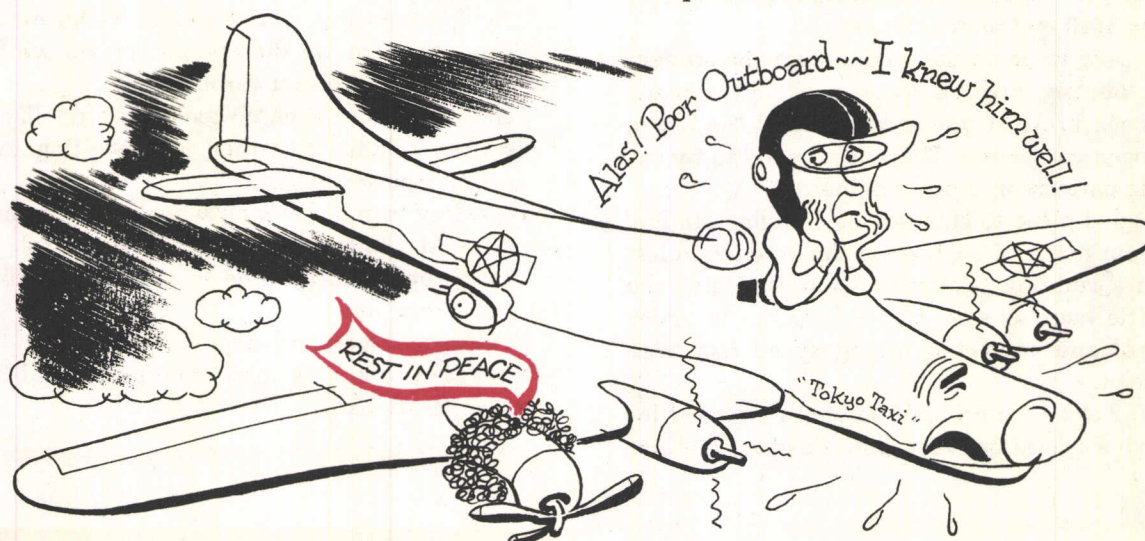
8. 2-engine landing.

**Note:** In all the above maneuvers, simulate a feathered engine by idling at approximately 12" Hg. manifold pressure.

When practicing these maneuvers, make the student feel that he is solving a real problem. Have him visualize his runway, and the obstacles near it. In each case let him decide whether to complete his takeoff or bring his airplane to a full stop. (For practice purposes, you may tell him to continue his takeoff, even though his own decision is to make a full stop.)

Select the engine to be cut by taking into consideration the height and distance of any obstacles, and the amount and direction of any crosswind.

The dead engine should be on the side of the airplane from which the crosswind is blowing. If the crosswind is on the side opposite the dead engine, the student will get a false impression of the characteristics of the airplane under various 3-engine conditions because of the relative ease with which he is able to handle it. Remember that he may be operating in a strong crosswind when an engine is actually lost on the upwind side.





## RESTRICTED

Use brakes only as an emergency measure on any of the takeoffs, either running or from a dead stop. The airplane cannot be held straight by the use of a brake, and tires will be worn dangerously or blown out.

Remind the student that in an actual emergency the propeller of the dead engine may be feathered to decrease its drag. However, stress the fact that it is not necessary to feather the dead engine immediately in order to recover. Teach him to take his time in feathering, in order to avoid the possibility of feathering the wrong engine during the excitement or confusion following engine failure.

Caution the student that while it is necessary to raise the landing gear as rapidly as possible after takeoff in order to increase speed, he must be certain that the airplane is airborne **before** actuating the landing gear switch.

Point out the danger of opening the bomb bay doors to jettison bomb bay tanks or bomb load under 2-engine conditions at low altitude. Explain that the open bomb bay doors create drag, and that they are slow in closing if the emergency release has been used. Emphasize: The drag thus created is sufficient to slow down the airplane below critical speed (about 5 mph below critical flying speed with 2 engines out).

In any of these instances when the student calls for the feathering procedure, give him approximately 12" Hg. manifold pressure on the "dead" engine in order to simulate feathering. **Do not practice feathering a good engine below 5000 feet above the ground.**

To save wear on the engines, **get the student back on four engines** as soon as the airplane has been brought under control and the lesson has been completed. There is no need to fly the traffic pattern on 2 or 3 engines.

A good place to start a 2 or 3-engine landing is to cut one or 2 engines on the downwind leg.

On a running takeoff or go-around give the throttle back as soon as the airplane is under control and correct climbing speed has been attained.

Emphasize the critical minimum airspeed for 2-engine operation when both dead engines are

on the same side. Explain that this critical speed varies with the weight of the airplane.

Point out the high stalling speed when turning into 2 dead engines.

To make sure that the student gets all 3 throttles open **simultaneously** in a go-around, demonstrate and rehearse the proper method of grasping these throttles prior to actual approach.

Stress the importance of applying necessary power as fast as the throttle control permits.

Stress the importance of maintaining sufficient altitude so that the final approach can be made with reduced power.

Point out that when a 3-engine takeoff is made in an actual emergency, all 4 throttles may be used and the takeoff made in the same manner as a crosswind takeoff.

---

### *Common Student Errors*

Becoming excited and failing to execute proper sequence of action.

Trimming too soon after takeoff, and failing to re-trim before landing.

Failure to increase rpm before increasing manifold pressure.

Overshooting the runway in a 3-engine landing. Remind the student that a 3-engine landing is made in the same way as a 4-engine landing.

Overshooting on a 2-engine landing with a long, low, dragging approach.

Use of too much power in 3-engine operation.

Trying to maintain directional control while airborne by differential throttling.

Tendency to begin climb too soon after flaps have been taken up, rather than waiting for airspeed to build up.

Tendency to pull back on wheel when pushing on rudder to maintain directional control.

Losing too much altitude in getting into the field on 2 engines.

Pattern too wide on 2-engine landing.

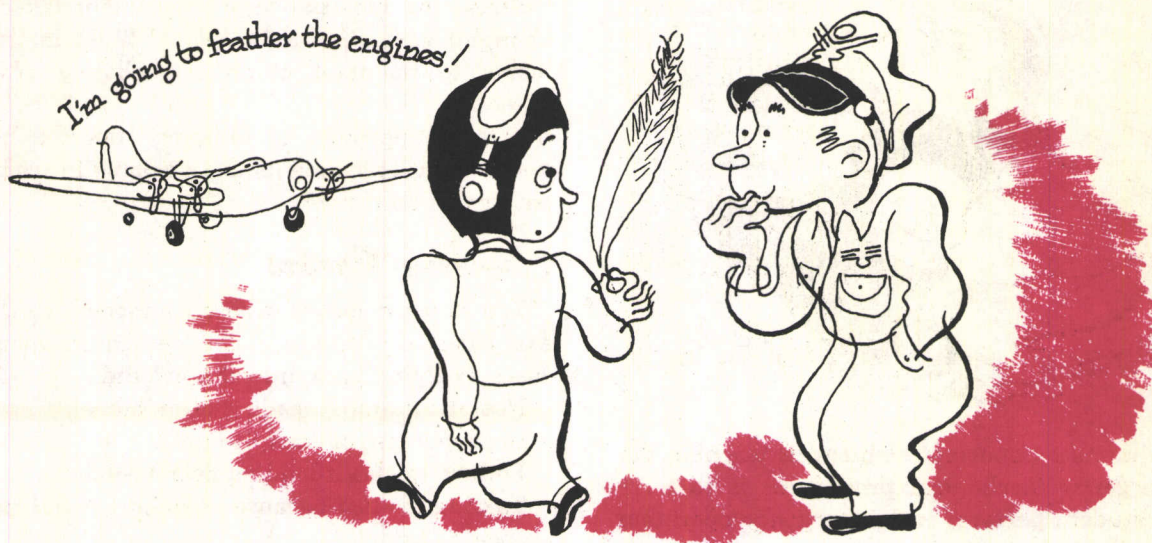
Disregard of engine instruments in 2 and 3-engine operations.

---



# FEATHERING

SEE PILOT'S MANUAL PAGES 140 TO 144



All feathering procedures should be directed toward the **emergency** feathering of the engine.

Remember that actual feathering of the engine is not necessary each time you demonstrate the emergency operation. Merely retard the throttle, and thereafter touch each control and state what is being done. Then, after the entire feathering procedure has been accomplished give the student 12" Hg. manifold pressure to simulate feathered operation. In those few cases during the course where the engine is actually feathered, use the practice feathering procedure.

Have the student visualize every feathering procedure as an emergency operation. Make him so familiar with this procedure that it is virtually automatic.

Make free use of an inboard engine for the feathering procedure to familiarize the student with the vacuum selector. You may also use this as a demonstration of the reduced de-icer action when an inboard is out.

Emphasize the correct sequence of feathering: (1) feathering button, (2) throttle off, and

(3) mixture control off. Each time an engine is feathered, have the student announce what auxiliary equipment is cut out.

Cultivate the student's judgment by having him explain under what conditions he would feather an engine. Call particular attention to directional control, amount of power lost, effect of runaway propellers, high manifold pressure, etc.

## Common Student Errors

Feathering the wrong engine by hitting the wrong button.

Wrong sequence in the feathering procedure.

Being too slow in using the right procedure.

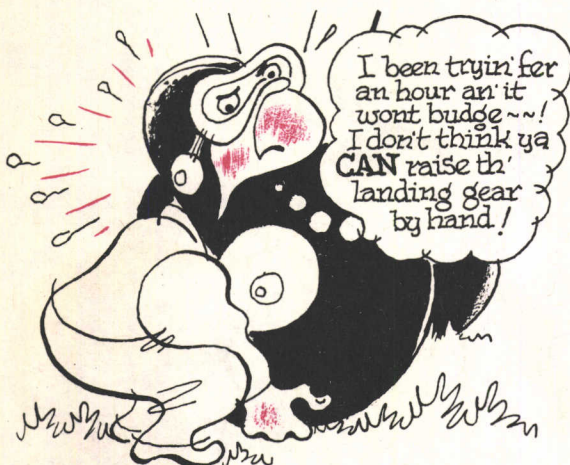
Failure to control airplane properly while completing feathering procedure. (Particularly true on instruments.)

Misuse of control lock.



# EMERGENCY MECHANICAL PROCEDURES

SEE PILOT'S MANUAL PAGES 133 TO 135



The most important element in teaching the emergency mechanical procedures is to have the student perform each emergency operation actually and physically.

At least once during the course, the student should be made to: manually lower and raise the landing gear; manually lower and raise the tailwheel; manually lower and raise the flaps; re-set the bomb bay doors after emergency release; operate the brakes with the hydraulic pump out; start and stop the auxiliary power unit; change necessary fuses in flight, and replace electric turbo amplifier in flight.

## Common Student Errors

Failure to check landing gear switch in neutral before manual operation of the gear.

# NIGHT FLYING

SEE PILOT'S MANUAL  
PAGES 99 TO 101

Stress those items on the amplified checklist which concern lighting.

Stress the danger of taxiing too fast or too close to obstructions.

Stress the importance of instrument takeoff at night; particularly the use of flight instruments to maintain climb immediately after takeoff.

Stress importance of dividing attention between flight instruments and airplane in traffic pattern or on runway.

## Common Errors

Too much concentration on airspeed, to the exclusion of attitude. (The result, in many cases, is flying back into the ground.)

Not maintaining heading after takeoff.

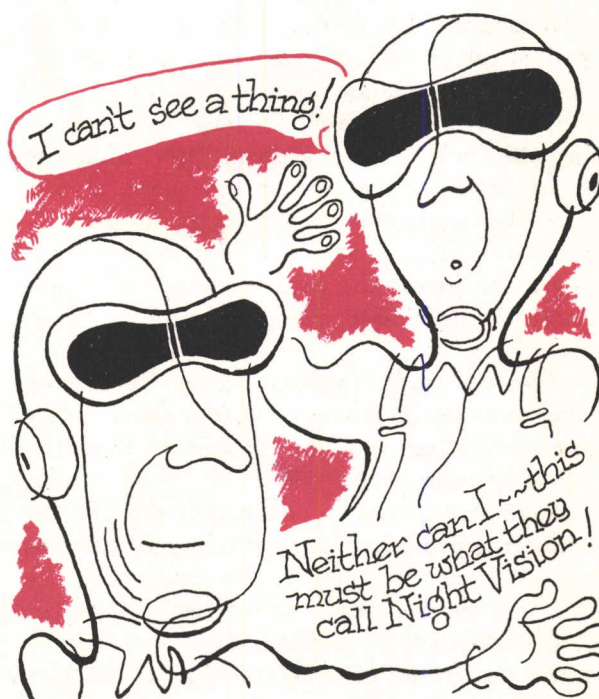
Improper use of cockpit lights.

Failure to check landing gear visually.

Taxiing too fast because of lack of visual reference points.

Failure to keep orientated in the traffic pattern.

Failure to observe night vision rules.





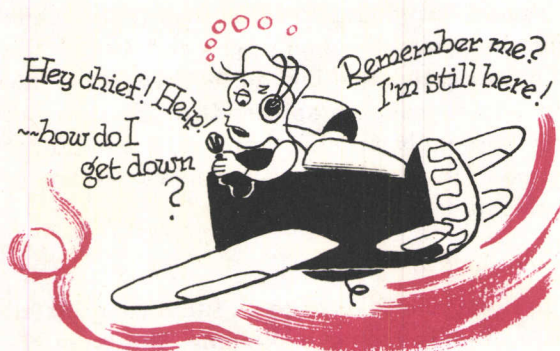
# INSTRUMENT FLYING

The basis for all instrument training in the B-17 is found in Technical Orders #30-100A-1, 30-100B-1, 30-100F-1.

Students entering 4-engine transition have completed the standard course in basic and advanced instrument training. The mission of this school is to ascertain that the student is proficient in all previous instrument flying, and to further his training by indoctrination in radio compass procedures.

Group your instrument lessons to consolidate most economically the flying time devoted to instrument training. The instrument phases are based primarily on proficiency. Therefore, establish or determine the student's proficiency in each phase before he progresses to the next.

No ironclad rule regarding time can be laid down, but all maneuvers should be covered as rapidly as the student's proficiency permits.



## Use the Link Trainer

Properly used, the Link trainer department can provide valuable aid in rounding out the student's weakness on instrument procedures. Visit the department personally and suggest any additional instruction required to correct student's deficiencies.

## Work the Safety Pilot

Students flying as safety pilot generally have little to do. Put the safety pilot to work. Have him draw a replica of the range, with headings,

bisectors, and quadrant signals, and follow the pilot's problem with a pencil line, marking any mistakes. This not only helps the safety pilot prepare for his turn at the controls, but imprints a range heading and pattern in his mind and develops analytical approach to instrument problems.



## Use the Interphone

To prevent having to explain the same thing to each student, have the students put on their headsets and listen on the interphone while you talk. Thus, you can check off the same information for both students and avoid the necessity of repetition.

## Stress Local Rules

Stress complete and thorough indoctrination in the local policy on range flying. Pay particular attention to altitudes on the range, let-down procedures and similar safety provisions of the local policy.

## Use the Blackboard

Use the blackboard both for briefing and for critiques after the period. This is one phase where diagrams can be used to great advantage, saving considerable air work and explanation while in flight.



## RESTRICTED

### Radio Training

Thorough knowledge of the radio is a prerequisite of satisfactory instrument flying. If student is weak on radio procedures, spend time on the ground to increase his proficiency.

### Hooded Takeoffs

To facilitate rapid hooded takeoffs, put up as much of the hood equipment as possible before taxiing to the takeoff position. Taxi the airplane yourself and let the student set up the instrument-flying equipment. (With some types of hoods it may be necessary to hold back part of the hood and set it up only after the airplane is on the runway.)

Demonstrate and explain fully. Take over in the air, occupying either the pilot's or copilot's seat and demonstrate the maneuvers you intend to teach the student.

Here it is most important to utilize the three basic principles of instruction:

1. Demonstration
2. Explanation
3. Let the student demonstrate

Demonstrate the maneuver by your own flying ability, at the same time explaining what you are doing and why you are doing it. Then have the student apply the knowledge in his own practice.

(Note: Consult the practical hints to instructors in the T. O. 30-100 series.)

## BOMB APPROACH

**SEE PILOT'S MANUAL  
PAGES 18-22 AND 183-190**

Don't neglect the bomb-approach phase of B-17 transition instruction.

Explain to the student that the purpose of the mission is to demonstrate pilot-bombardier cooperation, and not to develop his proficiency in bombing. Stress the importance of perfect pilot-bombardier coordination in making a successful bombing approach and run.

Brief the mission properly. Remember that this is the only mission of its type. Time is not

available to repeat a poorly planned mission. Results must be obtained during this period.

Be sure that the proper preflight is made before takeoff, actually engaging the controls of the autopilot and visually checking the control surfaces. Again: This is the only mission of its kind. If you wait to check your equipment until you are in the air, you may waste one or two hours of training time.

### C-1 Autopilot

To get the most out of the time allotted to the use of the C-1 autopilot, don't set up the equipment and then let everyone take a free ride with George doing all the work. Set it up and turn it off, so the student will get practice by actually using the equipment. He will learn nothing merely by riding along. It is by setting up and adjusting the equipment that he learns how to operate the C-1 autopilot.

After he has set it up, throw it out of adjustment by turning the controls, and then check to see if he knows how to readjust his equipment.

Take the student into the nose of the airplane and show him the bombsight clutch and the stabilizer clutch and how to set them up. Show him how to make a stabilized turn. Be sure you are thoroughly familiar with your equipment yourself; then pass on your knowledge freely to the student.

### Flying the PDI

In flying the PDI make all turns coordinated turns. Avoid slipping or skidding. This is doubly important in setting up the C-1 equipment. Coordinate with bombardier (on his preflight of bombsight) and check on PDI and interphone.

### *Common Errors*

Too little attention given to the mission.

Not holding constant airspeed and altitude.

Uncoordinated turns while flying PDI.

Inadequate preflight check.

Turning before bombardier cages bombsight gyros.

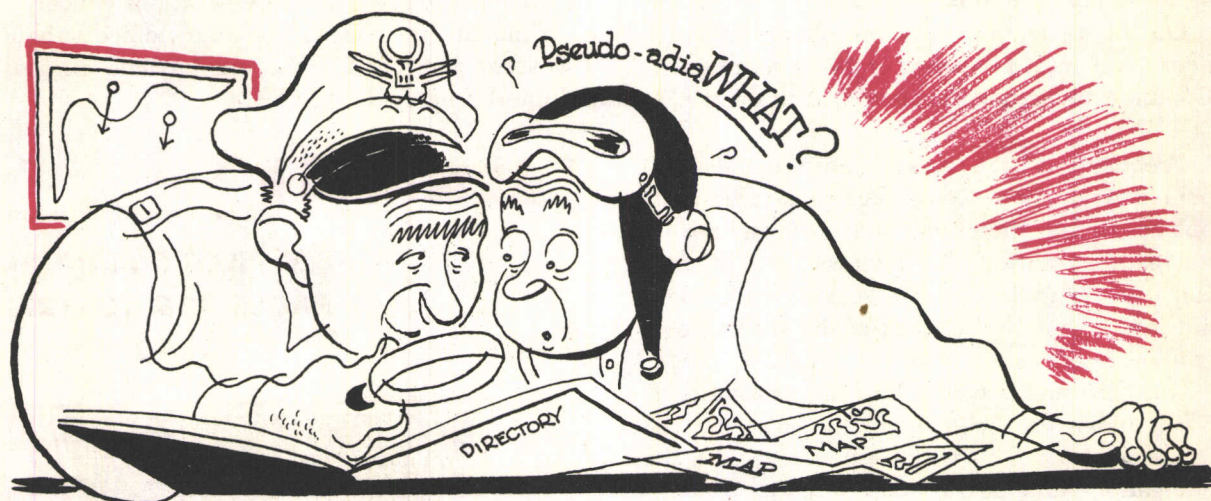
Student too tense on the controls when flying manual mission.

Failure to record autopilot time on Form 1A.



# NAVIGATION

SEE PILOT'S MANUAL PAGES 15 TO 18



After deciding on the airport of intended landing, have the student help you check the **Directory of Air Fields** for the following information: length of runways, type of runways, lighting equipment.

Have him check the **Weekly Notice to Airmen** for the latest information regarding the condition of the field.

Be sure that he has complete navigation equipment, including navigation kit, maps, DF charts and navigation logs.

Make him plot the course on sectional maps covering a radius of 100 miles. See that he gives due consideration to danger areas, terrain features and radio facilities. **Important:** Be sure that all students draw and complete the approved navigation log form.

Let the student or students fill out the Form 23, then check to be sure that it is complete in all details, and in accordance with weather information available, and the features of the terrain over which the flight is planned.

Be sure that the student understands his duty to check all weather information in the following sequence: (1) The latest weather maps, checked against the 3 previous maps; (2) the CAA 6-hour forecasts, and other available forecasts; (3) the winds-aloft charts; (4) hourly

sequence reports; (5) pseudo-adiabatic diagrams; and (6) the Form 23A (Vertical Information of Weather). Explain to the student that he must never merely "check" the weather; he must study it closely. Emphasize that the purpose is to **discover the expected intensity and trend of the weather**. Explain how he can obtain—through his discussion with the qualified forecaster—a complete picture of conditions along the route of the flight he has planned.

Explain the method of filing the Form F (Weight and Balance) with Base Operations, and the location of the form within the airplane.

## Conduct of Mission

If possible, assign 2 students to the navigator's compartment to direct the course of flight by means of dead reckoning and pilotage. Assign the copilot to use "follow-the-pilot" navigation by pilotage, and maintain fuel consumption data. Fly one-half of the flight time with either student under the hood, navigating as directed by navigator, or by radio range or radio compass.

Check continually to see that the students are making proper and correct radio fixes, and keeping a log correctly. Emphasize use of the E-6B computer. Have the student navigators



## RESTRICTED

give the radio operator all the information necessary for an hourly position report to AACS stations. Have the students contact CAA radio range stations to report their position, request weather and traffic information, file flight plans, or make changes in flight plans.

On all navigation missions obtain as much additional multiple-phase training as possible. Combine navigation, formation, altitude, etc., in one flight.

Frequent position fixes by radio compass will benefit navigation. Remember that radio must not be used to the extent that it detracts from navigation training. For instance, one student can use the radio compass so long as he does not interfere with the work of the student designated to act as navigator.

On these flights where half the navigation is done under the hood, have the pilot fly the range as an aid. This will not interfere with the navigation work of the other students.

On all long-range or short-range navigation, have the student use power charts to perform the mission more efficiently. See that he takes all factors into consideration and adheres strictly to the power charts.

On navigation missions where the students have varied duties, don't leave one student on one job too long.

Anticipate position reports. Have the student write out a complete message before time of transmission.

Emphasize use of radio facility charts and radio aids to navigation during flight.

Know your personal limitations and the limitations of your equipment, and do not exceed them in your desire to reach your destination.

### Termination of Mission

Always discuss with the student the landing conditions at the airport of intended landing, including traffic altitude, obstructions at ends of runways, and field elevation.

Upon landing, instruct the student concerning the requirements of the crew—charge him with the responsibility of seeing that the crew is properly quartered on overnight stops.

Have the student tell the crew the time of departure the following day if RON.

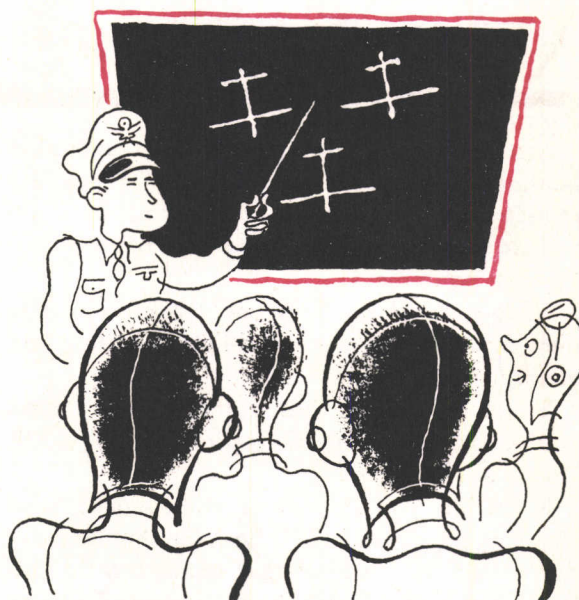
It is your responsibility to see that the airplane is properly serviced and the necessary servicing forms completed.

**Important:** It is your responsibility to send the RON to the Commanding Officer of your station in care of the Post Operations Officer.

Consult the local weather office about weather forecast for the night. Have engines diluted if necessary.

## FORMATION

**SEE PILOT'S MANUAL  
PAGES 119 TO 127**



1. Be sure that students are properly briefed before takeoff. Emphasize visual signals to augment radio conversation.

2. Use the blackboard to explain formations, distances, and changes from one type of formation to the other. Be sure the student knows the local rules for action in adverse weather.

3. Explain to the student that the basic purpose of formation flying at transition school is to teach him to maintain a constant position of his airplane in relation to the others in the



formation. Tactical doctrine is not the primary concern.

4. Time can be saved, and a better mission performed, if the aircraft participating in a formation are assembled on the ground prior to takeoff. This eliminates confusion and aids in assembling the formation immediately after takeoff.

5. Insist upon holding the airplane in the correct attitude. Most students have a tendency to slide into the formation, ultimately dropping into the slipstream of the lead airplane. You can obviate this by insisting that the student relax in his formation flying. At frequent intervals, have him fly with hands and feet off the controls. Emphasize that the airplane in formation flies just the same as when it's flying alone.

6. Use reference points on the airplane to aid in maintaining proper place in formation. Show the student how to line up rivets or points on the windshield with the lead airplane, and, by keeping them aligned, maintain his position.

7. Show the student how to trim the airplane properly for ease of flying.

8. Emphasize continuously the proper use of power. See that manifold pressure does not exceed allowable limits for the rpm used.

9. Emphasize the dangers of closing to position too rapidly when moving into formation.

10. Build up the formation training gradually. For example, make easy shallow turns at first, gradually increasing the turn as the student's proficiency increases.

11. Emphasize completing the landing check before entering the traffic pattern.

12. Impress on the student that he must consider the other aircraft in the formation as well as his own when timing his turns around the pattern and when spacing for landing. Emphasize the importance of landing and turning off the runway as rapidly as possible to allow space for the aircraft behind.

13. Be sure that the field is clear for landing before the formation breaks up. If you don't, you probably will not be able to get the formation together again.

Before leading a formation, review chapter on Formations in Pilot's Manual.

RESTRICTED

## ALTITUDE

SEE PILOT'S MANUAL

PAGES 72-76, 105-118, 169-173

### Preflight

The altitude mission affords another excellent opportunity for the student to practice his duties as airplane commander. In preflighting, the student, under supervision of the instructor, should check all equipment necessary for the flight, such as oxygen equipment, radio, and, if weather is anticipated, all de-icing and anti-icing equipment. He should also check to see that at least 2 crew members are on board and in the same compartment, and that their oxygen masks are properly fitted. He should question them on their knowledge of the use of oxygen. Brief the student and question him on the use of power for altitude and power reduction necessitated by turbo overspeed.

### Conduct of the Mission

The altitude mission may be conducted jointly with formation-navigation training in accordance with local policies. Make the climb with prescribed power curves, with emphasis on climbing power indoctrination and the use of oxygen at altitude.





## RESTRICTED

Remain above 25,000 feet for a minimum of 3 hours, traveling far enough to demonstrate the speed of the airplane at this altitude. It is important to have frequent interphone checks with all crew members to see that the interphone system is operating and all personnel okay.

Emphasize correct use of throttles and turbos, remembering the basic rule: **Throttles will be full on whenever superchargers are required for additional power.**

### Altitude Considerations

Have the student determine his true altitude throughout the flight by use of the E-6B computer. The altitude factor for power settings, it will be noted, is density (pressure) altitude, and not true altitude.

### High-Altitude Engine Roughness

Demonstrate and explain the causes of high-altitude engine roughness and methods of eliminating it.

### Demonstration at Altitude

Demonstrate the following equipment and flight characteristics at altitude:

1. Various power settings, including full military power. If in formation, the formation

leader announces changes over high-altitude command set.

2. Use of high-altitude command set SCR-522. Note that a crystal frequency common to all planes in formation must be chosen for interplane control.

3. Maneuver at high altitude.

4. Use of liaison set. Explain that it should not be used above 19,000 feet.

### Use of Oxygen and Oxygen Equipment (In the Air)

Oxygen should be turned on immediately after takeoff. Don't forget to demonstrate the use of the walk-around bottle.

---

## Common Errors

1. Failure to keep close check on engine operation.
  2. Failure to complete preflight and personal equipment check satisfactorily.
  3. Failure to maintain interphone communication during flight.
  4. Improper use of power during climb.
- 

